

C E Composites-04.US

SN 10/672,060

Schedule B  
to the Response the Office Action of June 7, 2006

Please amend the paragraphs of the specification to add the following new paragraphs to the Disclosure as follows:

[0036A] Fig. 6.1 shows a longitudinal cross-section of the third embodiment of the present invention showing a single wall polymer composite tubular bat in accordance with the present invention with an alternative construction showing a thickened barrel wall 21 resulting in increased radial stiffness generally confined to the sweetspot area of the barrel portion.

[0036B] Fig. 6.1A shows a cross-sectional area at a barrel location not within the sweetspot area.

[0036C] Fig. 6.1B shows a cross-sectional area within the sweetspot area showing a stiffened area with thicker barrel wall.

[0036D] Fig. 6.2 shows a longitudinal cross-section of the third embodiment of the present invention showing an alternative double wall polymer composite bat in accordance with the present invention showing a localized area of the fibre type and/or fibre angle change within the insert resulting in increased radial stiffness generally confined to the sweetspot area of the barrel portion.

[0036E] Fig. 6.2A shows a cross-sectional area at a barrel location not within the sweetspot area.

[0036F] Fig. 6.2B shows a cross-sectional area within the sweetspot area showing a stiffened area of changed fibre angles and/or type.

[0036G] Fig. 6.3 shows a longitudinal cross-section of the third embodiment of the present invention showing the alternative double wall polymer composite bat in accordance with the present invention with an alternative construction showing a thickened barrel wall 21 within the insert resulting in increased radial stiffness generally confirmed to the sweetspot areas of the barrel portion.

**[0036H] Fig. 6.3A shows a cross-sectional area of a barrel location not within the sweetspot area.**

**[0036I] Fig. 6.3B shows a cross-sectional area within the sweetspot area showing a stiffened area with thicker barrel wall.**

Please amend the pre-existing paragraphs of the specification to read as follows:

[0053] Other materials commonly used in bat constructions such as aluminum, wood and plastics are not anisotropic and are thus limited in controlling bat performance; for example, radial stiffness is equal to longitudinal stiffness and cannot be graduated along the barrel length 1. However, with composite materials, which are preferred, properties of bats made in accordance with the present invention, such as radial stiffness which determines bat performance can be controlled (i.e. designed to a given requirement) by altering such parameters as the fiber alignments along the bat length 1, and/or the type of fibers chosen, their diermer (e.g. fiber stiffness) or layout density and/or the thickness of the polymer composite structure. Such thickened polymer composite material is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel wall portion without there being present a boundary therebetween whereat different materials are in contact with each other.

[0062] The thin polymer composite stiffener 18 of the present invention has a stiffener wall which is typically in the order of .005 inches to .040 inches in thickness, with a length of 2 inches to 6 inches which is typically less than 50% of the barrel length, such as  $16 \frac{2}{3}$  % of the barrel length, as is apparent from Figure 10. A 4 inch stiffener, as referenced in paragraph [0059], in a 12 inch barrel as referenced in Figure 10, would represent 33.3% of the barrel length; a 4 inch stiffener in a 16 inch barrel would represent 25%, and a 2 inch stiffener in a 16 inch barrel would represent 12.5% of the barrel length. The stiffener 18 is preferably bonded, fully or partially, to the main member 16, or to the secondary member insert 13 of Fig. 7 or to the secondary member sleeve 14 of Fig. 8, or combinations thereof on either the internal or external barrel walls, as shown in Figures 4, 5, 7 and 8. Analogous to Figures 4, 5, 7 and 8 an alternative solution (since stiffness is proportional to thickness) to the stiffener 18 is to vary the barrel thickness 6 to the same extent and

manner along the barrel length 1 of any bat according to the invention, including the bat of Figure 6, in order to vary bat performance. The barrel portion's effective wall thickness in the mid-section can be greater by 5%  $[[8\ 1/3]]$  or more over the thickness of the barrel in the lateral, adjacent portions. Conversely, the barrel wall's thickness beyond its central portion, in the lateral regions proceeding towards the end portions of the barrel, may be at least 5%  $[[8\ 1/3]]$  thinner than the thickness of the barrel wall in the mid-section. Just as the stiffener wall may be typically in the order of .005 inches to .040 inches in thickness, or .010 inches to .040 inches in thickness, or .015 inches to .040 inches in thickness, or 0.015 inches to 0.030 inches, so too the analogous increase in barrel wall thickness along the mid-section may fall within the same ranges.

[0064] A third embodiment of the present invention Fig. 6 is a single wall tubular polymer composite baseball bat which in accordance with the present invention has a localized area of fiber type of greater stiffness and/or angle change 20 resulting in increased radial stiffness generally in the sweetspot area 19 located in proximity to the middle area of the barrel length 1. This embodiment applies equally well to double-wall and multi-wall (more than two walls) tubular all polymer composite baseball bats and is limited to newly designed polymer composite single wall, double-wall, and multi-walled new bats as opposed to field returned bats. The fiber types, and/or fiber angles, and/or fiber sizes, layout density and/or composite thickness can be designed as otherwise described such as to graduate the radial stiffness of the barrel wall within the barrel portion 1 along its entire length. That is, the radial stiffness could be highest in the peak performance area (generally the sweetspot area 19) and gradually changing in uniform increments proceeding towards the barrel ends.